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Conference Abstract

Where do Functional Traits Come From? The role of theory and models

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Abstract

There is a growing focus on species' traits in ecology, including initiatives to integrate trait data into biodiversity databases. This focus is motivated in part by a need to develop better predictive capacity for how species respond to environmental change. In this context, one is interested in functional traits – i.e. those with a defined link to environmental variability. This leads immediately to the questions of which traits to prioritise and how to characterise them. Here we argue that this can be achieved with greatest clarity by letting traits be defined by the equations of theoretical models that link individuals to their environments, i.e. mechanistic niche models. We illustrate this approach using the biophysical equations of heat and water exchange, and the metabolic equations of ontogentic growth. From this we derive a schema for a functional trait database that provides a high level of generality and consistency across taxa, and hooks into integrated predictive modelling frameworks. We argue that functional trait attribution at levels above the individual are unhelpful, but discuss how inferences can be made from individual-level functional trait data to populations and species.

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mechanistic niche model, metabolic theory, dynamic energy budget theory, biophysical ecology, functional trait

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